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Status of the American Badger (*Taxidea Taxus*) in Alberta

Dave Scobie

Alberta Wildlife Status Report No. 43

Alberta Conservation Association

Funded by Alberta Anglers, Hunters and Other Conservationists

Alberta SUSTAINABLE RESOURCE DEVELOPMENT

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PREFACE

Every five years, the Fish and Wildlife Division of Alberta Sustainable Resource Development reviews the status of wildlife species in Alberta. These overviews, which have been conducted in 1991, 1996 and 2000, assign individual species "ranks" that reflect the perceived level of risk to populations that occur in the province. Such designations are determined from extensive consultations with professional and amateur biologists, and from a variety of readily available sources of population data. A primary objective of these reviews is to identify species that may be considered for more detailed status determinations.

The Alberta Wildlife Status Report Series is an extension of the general statusing exercises (1996 *Status of Alberta Wildlife*, *The General Status of Alberta Wild Species* 2000), and provides comprehensive current summaries of the biological status of selected wildlife species in Alberta. Priority is given to species that are potentially at risk in the province ("At Risk," "May Be At Risk"), that are of uncertain status ("Undetermined"), or those considered to be at risk at a national level by the Committee on the Status of Endangered Wildlife in Canada (COSEWIC).

Reports in this series are published and distributed by the Alberta Conservation Association and the Fish and Wildlife Division of Alberta Sustainable Resource Development. They are intended to provide detailed and up-to-date information which will be useful to resource professionals for managing populations of species and their habitats in the province. The reports are also designed to provide current information which will assist the Alberta Endangered Species Conservation Committee to identify species that may be formally designated as "Endangered" or "Threatened" under Alberta's *Wildlife Act*. To achieve these goals, the reports have been authored and/or reviewed by individuals with unique local expertise in the biology and management of each species.

EXECUTIVE SUMMARY

The North American badger (*Taxidea taxus taxus*) is ranked as a "Sensitive" species in Alberta. Thus, the species is not currently at risk of extinction or extirpation but may require special attention or protection to maintain a healthy population (Alberta Sustainable Resource Development 2001a). Badgers are listed as furbearers under Alberta's *Wildlife Act*, which allows for year-round hunting.

The badger is distributed throughout southern Alberta, although much of this area has been converted to agricultural, urban and industrial use. The badger expanded its range into the aspen parkland following the clearing of wooded areas by early settlers. Badgers were probably numerous before the arrival of settlers; however, increased trapping in response to rising fur prices, and breaking land for cultivation led to a rapid decline in the Alberta population in the 20th century. Recent anecdotal evidence indicates that local populations may be stable to increasing.

Badgers are opportunistic feeders relying primarily on fossorial and semi-fossorial animals as their main prey items. They help control small mammal populations and in Alberta prey primarily on Richardson's ground squirrels and northern pocket gophers. Cover and nesting or denning opportunities for other wildlife are also byproducts of badger presence. For example, burrowing owls and swift fox are two of Alberta's species at risk that could not survive without the burrows provided by badgers.

The badger's home range size in Alberta is unknown, but studies in the United States reported a wide variation in home range size depending on the season. Also contributing to the problem of determining exact home range is their fossorial way of life; badgers are not easily visible.

The badger is essential to the prairie landscape, yet because of its nocturnal nature, this species is poorly understood. Soil genesis, the ability of water to reach deep into the soil, can directly result from badger activity.

Research on badger biology in Alberta is essential to determine management strategies for this species. Protection should be considered not only for the badger, but also for its habitat and prey species. An education program on the benefits that badgers provide to humans and to other wildlife should be initiated. Without these steps, the future of the badger, as well as of those species that depend on the badger, is uncertain.

ACKNOWLEDGEMENTS

This report would not have been possible without the patience and guidance of Isabelle Michaud, Sherry Feser (Alberta Conservation Association) and the rest of the crew at Alberta Sustainable Resource Development. I am indebted to Sylvia Normand and Hal Reynolds (Environment Canada) for allowing the use of the Draft COSEWIC 2000 Status Update on the badger. I thank Nancy Newhouse (Sylvan Consulting Ltd.), Arlen Todd, Gary Erickson and Joel Nicholson (Alberta Sustainable Resource Development) for supplying documents. A special thanks to Reg Russell for increasing the badger population in BSOD from 4 to 24 and Lyle Lester for sharing a personal badger observation. I am indebted to Kathy Scobie (Avocet Environmental Inc.), Gail Michener (University of Lethbridge), Sherry Feser, Dawn Birn (Alberta Conservation Association), Robin Gutsell, Reg Russell, Arlen Todd, Gary Erickson and Joel Nicholson (Alberta Sustainable Resource Development) for their critical review of earlier drafts of this report.

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INTRODUCTION

The North American badger (*Taxidea taxus*) is a member of the family Mustelidae, and is distributed throughout North America with four subspecies recognized as follows: *T. t. jeffersonii, T. t. berlandieri, T. t. taxus* and *T. t. jacksoni*. The subspecies *T. t. taxus*, which occurs in the grassland and parkland regions of Alberta, is ranked "Sensitive"* because of its local distribution. Opinions vary as to its population trend (Alberta Sustainable Resource Development 2001a, Alberta Wildlife Management Division 1996).

Uniquely adapted to a fossorial (digging, burrowing) way of life, badgers help control small mammal populations. Their burrows provide escape, overwintering, den and nesting opportunities for many wildlife species. The decline of this species is apparent when the 18 000 badger pelts harvested in 1928 are compared to the current population estimate of only 10 000. Trapping harvest, habitat loss and suspected declines of essential prey species such as the northern pocket gopher and Richardson's ground squirrel are contributing to a continued population decline.

This report is intended to compile and summarize recent information on the North American badger as a step toward updating its current status in Alberta.

HABITAT

Badgers are most often found in open, often treeless habitats with an available food source, usually other fossorial mammals. Badgers do not occur in heavily forested areas but inhabit open grasslands in the parkland, prairie and cold desert areas (Banfield 1974, 1982, Smith 1992, Pattie and Fisher 1999). However, a study in Minnesota on the movements and denning habits of a female badger documented the use of a woodlot during summer and autumn as well as during winter when it was used as an exclusive denning area (Sargeant and Warner 1972).

Badgers may be found in a variety of habitats in Alberta. In Waterton Lakes National Park, badgers have been found in the prairie foothills sections of the park that are characterized by open prairie, brushy bottomlands and aspen groves (Soper 1973). Southeast of Wainwright, badgers were found in an area where the major topographic features were the Ribstone Creek, a marsh system, lakes, extensive tract of sand ridges and a mix where the sand-ridge/marsh ecosystems met (Salt 1976). A 1.4-ha study site east of Picture Butte, Alberta, that is part of a 13-year continuous study focusing on Richardson's ground squirrels (*Spermophilus richardsonii*), was surrounded by cultivated fields and a farmyard into which badgers ventured (Michener 2000). A study at the Suffield National Wildlife Area documented such a low number of badgers that habitat preference could not be determined (Carbyn et al. 1999).

According to a questionnaire completed by wildlife management personnel in 1998, suitable habitat is widespread in Alberta (Newhouse and Kinley, in prep.). The quality/quantity of habitat decreased dramatically relative to pre-settlement conditions. World Wildlife Fund Canada (1988) states that approximately 24% of the mixed prairie and 25% of the aspen parkland remain in their native state. Clearing of the aspen parkland has allowed for range extensions. However, cultivation, urbanization and industrial activities have probably restricted badgers from areas they once inhabited by eliminating habitat and prey availability (Messick 1987, Newhouse and Kinley, in prep.).

CONSERVATION BIOLOGY

The North American badger is the only species of badger that occurs on this continent. Badgers in the Eastern Hemisphere are larger and are not fossorial (Banfield 1974, Messick 1987). Four subspecies, separated on the basis of skull morphology, pelage color and geographic isolation, are found in North America and

* See Appendix 1 for definitions of selected status designations.

are described by Long (1972). In Canada, *T. t. jeffersonii* is found in southern British Columbia; *T. t. taxus* in Saskatchewan, Alberta and Manitoba; and *T. t. jacksoni* in southern Ontario. *T. t. berlandieri* is distributed through the southern United States and northern Mexico.

As described by Soper (1964), this nocturnal mustelid is thick-set, broad, squat and muscular, with short powerful legs. The badger has short ears, a short tail, a pointed nose and a broad triangular head. The pelage of the sexes is similar (Messick 1987, Minta 1993). The thick pelage is yellowish gray with a white stripe that originates on the nose and extends back into the shoulders. The fur is longer on the sides forming a fringe that, coupled with loose skin, adds to the flattened appearance and flowing nature as the animal moves. The "badge" is a dark vertical triangular patch behind the eyes that is surrounded by white or yellowish fur. The lower legs are dark brown terminating in black at the extremities. (Soper 1964, Pattie and Fisher 1999). Uniquely adapted for digging, the front feet are partially webbed and have long claws up to 5 cm in length.

Northern pocket gophers (*Thomomys talpoides*) and Richardson's ground squirrels are considered the badger's primary prey species in Alberta (Newhouse and Kinley, in prep.). North American badgers are also opportunistic feeders and supplement their diet of fossorial and semifossorial prey with a wide variety of mammals, birds, eggs, reptiles, amphibians, invertebrates, fish, mollusks, and plant material (Drake and Presnall 1950, Messick and Hornocker 1981, Lindzey 1982, Sovada et al. 1999). Badgers will also eat carrion and cache food items (Snead and Hendrickson 1942, Dagg 1974, Lindzey 1982, Michener 2000, L. Lester pers. comm.).

Didiuk (1999) reported badgers preying upon snakes at their hibernacula in Alberta. They have also been documented preying upon ducks and nests in studies in Holden, Hay Lakes, Penhold and Gayford areas of Alberta and the United States (Johnson et al. 1989, Sargeant et al. 1993, Sovada et al. 1999). Badgers also prey on some "At Risk" and "May Be At Risk" species in Alberta such as the burrowing owl (*Speotyto cunicularia hypugaea*), swift fox (*Vulpes velox*) and Ord's kangaroo rats (*Dipodomys ordii*) (Cotterill 1997, Gummer 1997, Wellicome 1997). However, the burrows that badgers create are used by many different species (e.g., burrowing owl, swift fox, snakes, etc.)

Dens/burrows (these terms are used interchangeably) are essential to the badger, serving as sites for diurnal (daytime) activity, food storage, parturition (birthing), and as the focus for foraging activities. Badgers hunt primarily at night and remain underground during the day. However, Messick and Hornocker (1981) found that the young of the year tend to be active during daylight hours. Dens are variable in characteristics and are sometimes reused, by the same or other badgers at different times (Lindzey 1982, Newhouse and Kinley 2000, Newhouse and Kinley, in prep.).

Natal dens may be up to 10 m in length with a diameter of about 30 cm. The nest is built out of bulky grasses in an expanded chamber (Banfield 1974, Pattie and Fisher 1999). A female badger in Utah used numerous dens in the summer and autumn, but confined her activity to one den in the winter (Sargeant and Warner 1972). Lindzey (1976) describes natal dens as usually having one entrance, a mound twice the size of day-use dens, more numerous tracks on the mound and an abundance of badger hair mixed in with soil on the mound. He found that badger hair mixed throughout the soil on the mound was the most reliable indicator of a natal den. A female may shift her hunting area by moving dependent young from one den to another (Lindzey 1976, Messick and Hornocker 1981). Soil excavated from dens is piled at the entrance to form mounds in which badgers will bury their scat. During cold weather, badgers will plug the entrance of burrows in winter with loose soil (Lindzey 1982).

The association between badger burrows and mounds of excavated soil is poorly understood but may be important for plants, animals and soils. Small mammals and a variety of other animals use abandoned badger dens (Messick and Hornocker 1981, Snead and Hendrickson 1942). In Alberta, swift fox (Cotterill 1997), burrowing owls (Wellicome 1997) and snakes (Didiuk 1999) use abandoned burrows for dens, nests and hibernacula, respectively. Badger diggings help to aerate the soil, promote the formation of humus (organic part of soil) and allow water to quickly reach deeper soil levels (Messick 1987, Newhouse and Kinley, in prep.).

Badgers do not hibernate in their burrows during winter but enter into torpor – a period of reduced activity in response to cold weather. They are usually not active at temperatures below -15° C, or during periods of reduced prey availability.

Mature badgers (> 15 months old) in the United States range in total length from 66-89 cm (Messick 1987). On average, males weigh about 26% more than adult females, at 8.4 kg and 6.4 kg respectively (Messick 1987). A large male weighed 12.9 kg in one study (Lindzey 1982, Messick 1987). Male and female sex ratios have been reported to be between 1:1 (Stardom 1979, Messick and Hornocker 1981) and 1.75: 1 (Minta 1993).

Messick and Hornocker (1981) suggested that badgers are polygynous (males have more than one female mate) under the conditions that all females come into estrus, the sex ratio is balanced and some juvenile females may breed. Mating occurs in late July and August with implantation delayed (a characteristic of mustelids) until February. Litters of one to five young are born between late April and June with the young usually dispersing at three to four months of age (Lindzey 1976, Pattie and Hoffman 1990, Pattie and Fisher 1999). Dispersing young may account for sightings of badgers during the day in unsuitable habitat. In Idaho, Messick and Hornocker (1981) found that most first year badgers dispersed a maximum of 52 km for females and 110 km for males.

Home range size for a female badger in Minnesota varied greatly from 2 ha in winter, to 53 ha in autumn and 761 ha in summer (Sargeant and Warner 1972). Lindzey's (1978) average reported home range sizes for badgers in Idaho during autumn and winter were 583 ha for males (n=2) and 237 ha for females (n=3). In Idaho, Messick and Hornocker (1981) found that during spring and summer, males (n=5) and females (n=11) had mean home range sizes of 170 ha and 130 ha, respectively. Males tended to have larger home ranges that overlap and may triple in size during the breeding season, whereas females tended to be spatially isolated from each other. Newhouse and Kinley (2000) found home ranges in British Columbia were 5 to 270 times larger than those reported from studies in the United States based on 100% minimum convex polygon. A dispersed prey base, marginal habitat and low population density may have contributed to the large home range size in British Columbia.

Badger density in southeastern Wyoming was estimated to be one adult animal per km^2 (Goodrich and Buskirk 1998). Messick and Hornocker (1981) estimated that in Idaho there were two to six adult badgers per km^2, increasing in density during the period when juveniles were dispersing.

Natural forms of mortality are not easily documented because of the badger's fossorial and nocturnal lifestyle. Cooperative predation by coyotes (*Canis latrans*) on a badger was witnessed by Rathbun et al. (1980). Other badgers, bears (*Ursus* spp.), wolves (*Canis lupus*), cougars (*Felis concolor*), golden eagles (*Aquila chrysaetos*) and bald eagles (*Haliaeetus leucocephalus*) occasionally kill badgers, usually before the badgers reach maturity (Lindzey 1982, Messick 1987). Badgers have been aged to 14 years in the wild but most do not live for more than 4 years (Messick and Hornocker 1981). Coyote control programs can increase badger and

other faunal community abundance (Robinson 1953, Robinson 1961, Linhart and Robinson 1972, Henke and Bryant 1999). A study by Robinson (1953), after the use of Compound 1080 stations to control coyote numbers in the Wyoming, New Mexico and Colorado, showed that badger populations in 1951 were 196% of 1940 levels. Recognizing the natural fluctuations in carnivore populations, the study was repeated in 1960 and showed that badger populations were 8-fold higher in 1960 than 1940 (Robinson 1961). In 1970, the indices did not differ from those of previous decades (Linhart and Robinson 1972).

Several examples of badger-coyote relationships exist in folklore and have been documented in reviewed literature (Hawkins 1907, Cahalane 1950, Seaburg and Amoss 2000). Kiliaan et al. (1991) report a badger and coyote hunting together near Cypress Hills Provincial Park, Alberta. They also review published literature that shows coyote-badger interactions that range from mutually affectionate and cooperative to harassment and predation of badgers by coyotes. Other results showed that a coyote's available hunting habitat increased greatly while hunting with badgers (Minta et al. 1992). Minta et al. (1992) further surmized that badger-coyote associations were probably neither cooperation, nor mutual consideration, as all behaviour appeared to be directed to prey capture or toleration of the other.

DISTRIBUTION

1. Alberta. - The range of the North American badger in Alberta extends roughly from the North Saskatchewan River south to the Montana border and from the foothills east to the Saskatchewan border. Coues (1877) adopted the northward limit of the distribution described by Richardson as being no further north than 58° latitude (just south of Wood Buffalo National Park). Quoting Richardson's accounts from the early 1800s, he goes on to state that the badger (then known as *Meles labradoria*) "frequents the sandy plains or prairies which skirt the Rocky Mountains as far north as the banks of the Peace River, and sources of the River of the Mountains, in latitude 58°." Soper (1946) notes that in 1927, badgers were abundant in southern Alberta.

A recently killed specimen was reported at a trading post on the Athabasca River below the mouth of the Clearwater River (about 56° 45" N) in 1908 (Soper 1964). Soper goes on to say that no badgers have been recorded north of the North Saskatchewan River in the last half century. Badgers had been hunted to the point of extirpation in the High River District in 1937 (Fowler 1937). Banfield (1974) plots the three extra-limital records as shown by Soper (1964). However, the extra-limital records in the range maps of Soper (1964) and Banfield (1974) appear to be from former fur trading posts, thus the source of the specimens is questionable (Newhouse and Kinley, in prep.)

Newhouse and Kinley (in prep) provide the most recent distribution of the badger in Alberta, which is considered to be relatively accurate (+/- 5%) (Figure 1). This map includes a range extension north of the North Saskatchewan River, similar to that presented by Seton (1909), but different from Stardom's (1979) distribution map which showed that the range extended into the Peace River area.

The range expansion north of the North Saskatchewan River is supported by Alberta Provincial Museum records that document badgers at the town of Legal (Township 57, Range 25 W4M; Appendix 2), 1.2 km northwest of Calahoo (Township 55, Range 27 W4M). The furthest west records are in Rge. 2 W5M. The range map presented by Newhouse and Kinley (in prep.) and adapted for this report therefore accurately reflects the current badger distribution in Alberta (Figure 1).

2. Other Areas - Newhouse and Kinley (in prep) sent out questionnaires to wildlife managers in North America and the responses are indicated in Figure 2. This map reflects what Seton (1909) proposed for the North American distribution of badgers and reflects changes to delimit records that reflected escaped animals or very recent

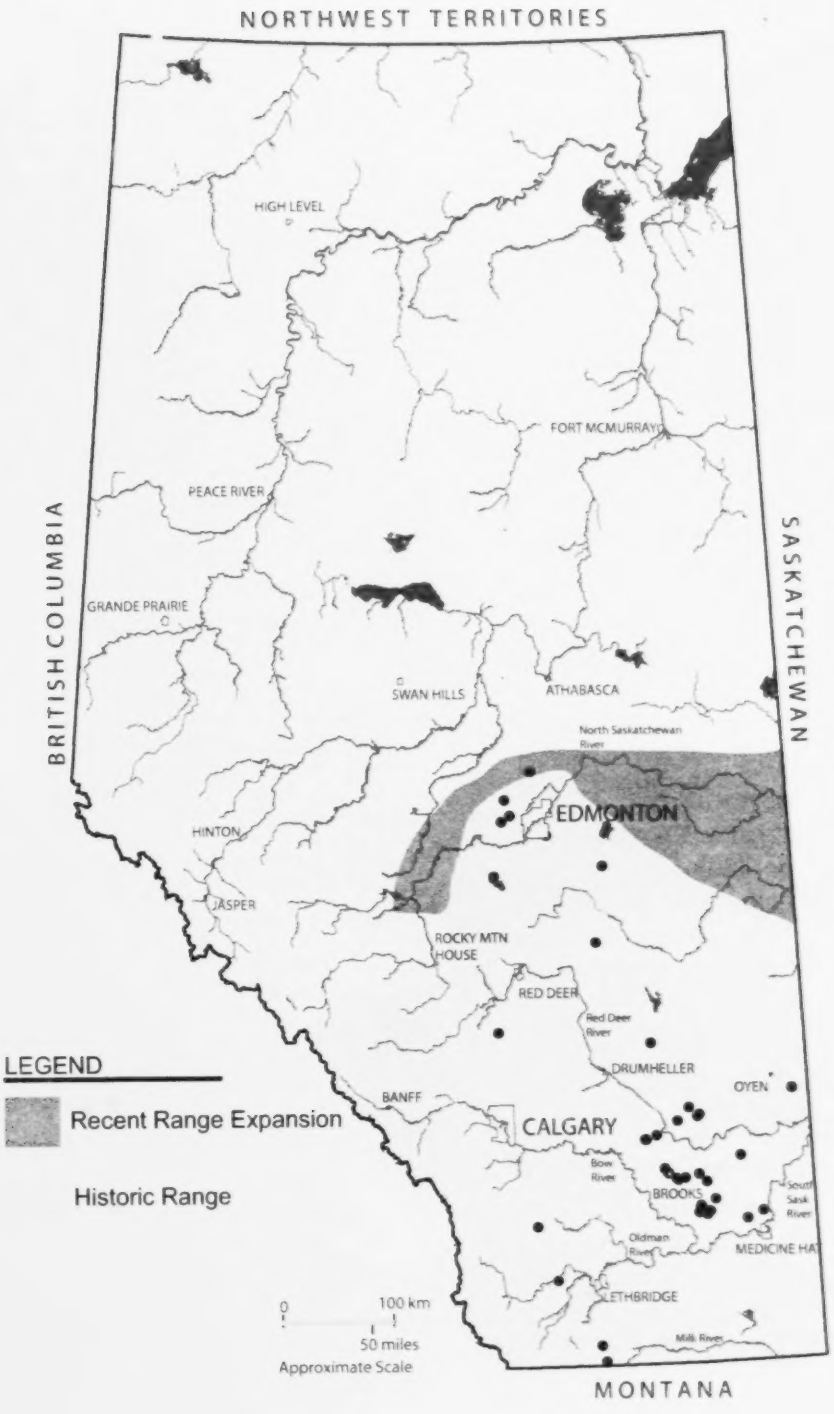

Figure 1. Range of the North American badger, *T. t. taxus*, in Alberta, 1998, including recent range expansion. Ranges based on surveys completed by provincial wildlife agency personnel. Available data are limited so ranges shown are approximate (adapted from Newhouse and Kinley, in prep.).

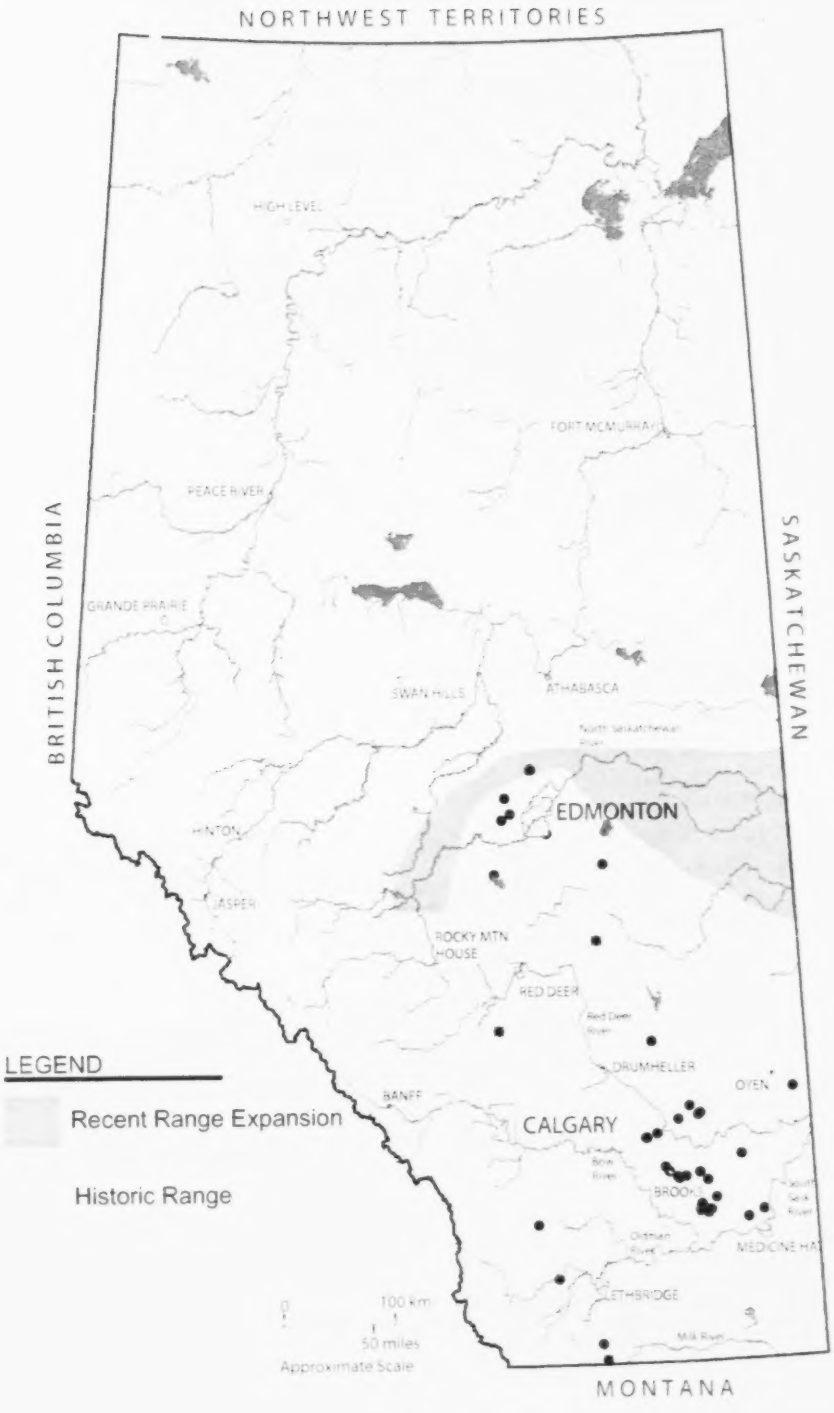

Figure 1. Range of the North American badger, *T. t. taxus*, in Alberta, 1998, including recent range expansion. Ranges based on surveys completed by provincial wildlife agency personnel. Available data are limited so ranges shown are approximate (adapted from Newhouse and Kinley, in prep.).

Figure 2. Range of the North American badger, *Taxidea taxus*, indicating its four subspecies in the USA and Canada, 1998. Subspecies range limits corrected based on recent literature and surveys completed by provincial and state wildlife agency personnel or other local experts. Range of *T. t. jacksoni* may extend from Minnesota into northwestern Ontario, either as extralimital forays or possibly as small resident population. Existence of *T. t. jacksoni* in southeast Manitoba is highly questionable; badgers in that area are more likely to be *T. t. taxus*. Lines were smoothed where range limits drawn by respondents did not match across jurisdictional boundaries (adapted from Newhouse and Kinley, in prep.).

Figure 2. Range of the North American badger, *Taxidea taxus*, indicating its four subspecies in the USA and Canada, 1998. Subspecies range limits corrected based on recent literature and surveys completed by provincial and state wildlife agency personnel or other local experts. Range of *T. t. jacksoni* may extend from Minnesota into northwestern Ontario, either as extralimital forays or possibly as small resident population. Existence of *T. t. jacksoni* in southeast Manitoba is highly questionable; badgers in that area are more likely to be *T. t. taxus*. Lines were smoothed where range limits drawn by respondents did not match across jurisdictional boundaries (adapted from Newhouse and Kinley, in prep.).

introductions into the eastern states and Pacific coastal area. The range boundary also follows Messick (1987) and Lindzey (1982).

POPULATION SIZE AND TRENDS

1. Alberta. - It is important to note that historical trapping harvest, particularly when pelt prices were high, had considerable impact on badger populations. The Hudson's Bay Company recorded over 96 000 badgers traded between 1843-1908. Records for Alberta from 1919-1984 estimate over 122 000 pelts traded, 39% of the total Canadian harvest. In 1928, the average price was considered high at $49.41 per pelt, with an estimated harvest of close to 18 000 pelts in Alberta. The price peaked again in 1978 with an estimated 245 pelts trading for an average price of $35.25 (Novak et al. 1987). Todd and Giesbrecht (1979) state that there was no protection for the badger from trapping until 1935, when a closed trapping season was declared with the exception of those with a special permit. The closed season lasted until 1941 when all protection was removed. From 1944-1977, there were no trapping restrictions on badgers anywhere in Alberta. In 1977, the current regulated open season was established (Todd and Giesbrecht 1979).

The impact historical trapping had on badger populations is supported by the following anecdotal evidence. In 1927, badgers were reported as being common in southern Alberta, with individuals and dens seen on numerous occasions over wide areas (Soper 1946). Between 1934 and 1943, Soper found only scattered signs where badgers had been abundant in 1927. Fowler (1937) and Soper (1964) both note that badgers had been extirpated in many areas. Todd and Giesbrecht (1979) state that from 1935-1941, unregulated harvests clearly suppressed badger populations and resulted in a closed trapping season.

Sixty-four records of badgers are presented in the Appendix 2 and comprise Alberta Sustainable Resource Developments' Biodiversity Species Observation Database (n=24), Provincial Museum of Alberta (n=22) and Canadian Forces Base Suffield National Wildlife Area (n=18). According to questionnaires distributed to all jurisdictions in North America in 1978, badgers were considered common in Alberta (Stardom 1979). Fur harvest records may indicate population trends if the data are collected systematically and the technique is applied to furbearers of low commercial value (Lindzey 1982). Normally, harvest statistics reflect fur prices and management strategies. Based on a questionnaire, Alberta's "best guess" badger population is estimated to be from 1000-10 000 individuals (within a range of an order of magnitude) and the recent trend is considered decreasing (Newhouse and Kinley, in prep.). Even the most generous estimate puts the Alberta badger population at only about half of the known 18 000 badger pelts harvested in 1928.

Schowalter (2000) conducted 46 interview surveys of Agricultural Fieldmen, ranchers and others with special knowledge in south-central and southern Alberta during 2000. Schowalter found badger numbers to be increasing in the Lethbridge Region, the Municipal District of Taber, parts of Stettler County, and the area northwest of Hanna. However, interviewees reported long-term declines in the Counties of Vulcan and Starland, on grazing lands west of Nanton, in the areas southwest of Calgary and south of Pincher Creek. Other areas reported stable to increasing numbers, although limited in some areas by locale. In three provincial parks – Dinosaur, Cypress Hills Interprovincial Park and Chain Lakes – badgers were thought to have always been rare or absent (Schowalter 2000). Although badgers are stable to increasing locally in Alberta (Schowalter 2000), populations are thought to be decreasing provincially (Newhouse and Kinley, in prep).

2. Other Areas. - The *T. t. taxus* population, according to a 1998 questionnaire, is estimated to be between 13 700 and 28 900 in Saskatchewan and 3000 and 5000 in Manitoba, providing an estimated Prairie population to between 17 700 and 43 900 animals. In British Columbia, the

T. t. jeffersonii population is estimated between 250 and 600 individuals. The *T. t. jacksoni* population in the Great Lakes Forest area of southern Ontario is estimated at 0 to 200 badgers. Population sizes for the United States are not well known, but the total American population is probably several hundred thousand animals (Newhouse and Kinley, in prep.).

According to the same questionnaire used by Newhouse and Kinley (in prep.), the recent trend in Saskatchewan is downward, while Manitoba may be stable, and the trend in Ontario is uncertain. Survey results presented by Messick (1987) indicated that the badger was decreasing in southwestern Idaho, California, New Mexico and some parts of South Dakota, and increasing in Kansas, Missouri, Wisconsin and Michigan. Of the states bordering Canada, only Michigan indicated a small increase in recent years. It should be noted that for much of the United States, trends are unknown or there was no response to questionnaires (Newhouse and Kinley, in prep.).

LIMITING FACTORS

Changing land uses and loss of prey appears to be the major factors negatively affecting badgers. The clearing of forests may have encouraged badgers to expand their range in some areas, but cultivation has probably removed badger habitat (Soper 1964, Stardom 1979, Lindzey 1982, Messick 1987, Smith 1992, Newhouse and Kinley, in prep). Badgers are trapped, shot and poisoned by humans because their diggings are thought to cause broken legs in livestock, lead to water loss from irrigation canals, cause damage to vehicles encountering their burrows and cause damage in cemeteries when excavating into graves. Badgers have also been known to destroy birds and eggs of captive game bird raise/release operations (Soper 1964, Stardom 1979, Lindzey 1982, Messick 1987, Newhouse and Kinley, in prep., G. Erickson, pers. comm., R. Ernst, pers. comm.). Badgers may be hunted without a licence and during all seasons, by residents on privately owned land to which the resident has the right of access (Alberta Sustainable Resource Development 2001b). Rodent control programs can also affect food supply (Robinson 1953).

The most visible cause of mortality of badgers is caused by humans (Lindzey 1982, Messick 1987). Trapping for pelts has affected badger populations, mainly in response to rising fur prices, but has not had a significant influence on badger populations in recent years. During the 1998-1999, 1999-2000 and 2000-2001 seasons in Alberta, 161, 76 and 170 badger pelts were trapped, respectively, for approximately $20-$25 a pelt (Alberta Environment 2000a, 2000b, Alberta Sustainable Resource Development 2001b).

Road kills, high fur prices, and loss of denning sites are possible specific limitations (Stardom 1979, Newhouse and Kinley 2000). Intensive petroleum development and urban expansion have caused increased road mortalities and may limit habitat and prey available to badgers.

The literature does not report direct mortality by fire on badgers. Fire will affect habitat by retarding the encroachment of woody vegetation. Badgers will probably leave an area if prey decreases, but some small mammals increase on fire-disturbed lands, potentially increasing badger populations (Sullivan 1996).

STATUS DESIGNATIONS

1. Alberta. - In 1991, the badger was "Yellow-listed" (Alberta Fish and Wildlife 1991) and in 1996 it was ranked "Yellow A"' because of concerns expressed over long-term population declines in Alberta (Alberta Wildlife Management Division 1996). According to *The General Status of Alberta Wild Species 2000* (Alberta Sustainable Resource Development 2001a) the badger is considered "Sensitive" and may require special attention or protection to prevent it from becoming at risk of extirpation or extinction in Alberta.

2. Other Areas. - The badger was designated "Not At Risk" by COSEWIC in 1979 (Stardom 1979). The Canada-wide listing was deactivated in May 2000 when the North American badger species was split according to subspecies (COSEWIC 2002). *T. t. jeffersonii* (British Columbia) and *T. t. jacksoni* (Ontario) were designated as "Endangered" and *T. t. taxus* (Alberta, Saskatchewan and Manitoba) was designated as "Not At Risk" (COSEWIC 2002)

The badger is listed as S1 (critically imperiled) in British Columbia (BC Conservation Data Centre 2002), S3S4 (Rare-uncommon, common) in Saskatchewan (Saskatchewan Conservation Data Centre 2002), S4 (widespread, abundant and apparently secure) in Manitoba (Manitoba Conservation Data Centre 2002) and S2 in Ontario (Ontario Natural Heritage Information Centre 2002).

The North American badger is not found on the 2000 International Union for Conservation of Nature and Natural Resources Red List of Threatened Species (IUCN 2000). NatureServe (2001) lists *T. taxus* as G5, "demonstrably widespread, abundant, and secure," as it has a large range in the western and central United States, southern Canada, and northern and central Mexico. It is relatively common but probably has declined in areas subject to control of colonial rodents.

RECENT MANAGEMENT IN ALBERTA

The badger is classified as a furbearer but is not a major target of wild fur production in Alberta (Alberta Environment 2000a, 2000b). Seasons do exist in all areas of Alberta except Fur Management Zones 1 and 2 found approximately north of Slave Lake. The seasons are open from 1 December to 15 April in most areas except Zone 8 (southern Alberta), where the season is open from 1 December to 31 March (Alberta Sustainable Resource Development 2001b).

To date, there have been no specific management or research activities focusing on the North American badger in Alberta.

SYNTHESIS

The badger was once distributed throughout the prairies, but its numbers have declined dramatically since settlers introduced livestock, intensified agricultural practices and increased trapping. The range is thought to have expanded northward because of the clearing of the aspen parkland. However, suppression of fire is contributing to the expansion southward of shrubs and woody vegetation, which limits available badger habitat. Loss of essential prey species like the northern pocket gopher and Richardson's ground squirrel is thought to have a detrimental affect on badger populations.

It is noteworthy that all information to date on Alberta's population has been "best guesses" of managers, and no studies have been undertaken. The lack of records in Alberta's Biodiversity Species Observation Database (BSOD) highlights the need to report on species which are not of immediate management concern. This could include observations of badgers in the field, those trapped, those killed as nuisance animals and those road-killed. Lacking direct observations, reporting areas of recent badger activity (fresh diggings) may indicate preferred habitat and distribution.

Research on the biology of the badger in Alberta is essential for management of the species. Research into its prey species and their combined ecological implications (e.g., burrows providing shelter, soil interactions, etc.) could be coupled with an educational component that would demonstrate the badger's benefits to both people and wildlife. Some level of protection for badgers (e.g., remove from the list of furbearers subject to trapping), along with their prey and habitat, should be enacted.

LITERATURE CITED

Alberta Environment. 2000a. Badger *Taxidea taxus*. URL: http://www3.gov.ab.ca/srd/fw/trapping/index.html [Accessed: 6 December 2000].

Alberta Environment. 2000b. 2000 Alberta guide to trapping regulations. Alberta Department of Environment, Edmonton, AB. 16 pp.

Alberta Fish and Wildlife. 1985. A policy for the management of threatened wildlife in Alberta. Alberta Fish and Wildlife, Edmonton, AB. 34 pp.

Alberta Fish and Wildlife. 1991. The Status of Alberta Wildlife. Alberta Forestry, Lands, and Wildlife, Wildlife Management Branch, Edmonton, AB. 49 pp.

Alberta Sustainable Resource Development. 2001a. The General Status of Alberta Wild Species 2000. Fish and Wildlife Service, Edmonton, AB. 46 pp.

Alberta Sustainable Resource Development. 2001b. 2001 Alberta guide to trapping regulations. Alberta Sustainable Resource Development, Edmonton, AB. 16 pp.

Banfield, A.W.F. 1974. The mammals of Canada. University of Toronto Press, Toronto, ON. 438 pp.

British Columbia Conservation Data Centre. 2002. Tracking Lists. British Columbia Ministry of Environment, Lands and Parks. URL: http://srmwww.gov.bc.ca/cdc/ [Revision date: 9 January 2002].

Cahalane, V.H. 1950. Badger-Coyote "Partnerships". Journal of Mammalogy 31:354-355.

Carbyn, L.N., M. Woelfl and H. Schinke. 1999. Carnivore Component Report. In Canadian Forces Base Suffield National Wildlife Area Wildlife Inventory. Canadian Wildlife Service, Environment Canada, Edmonton, AB. 69 pp.

COSEWIC. 2002. Database. Committee on the Status of Endangered Wildlife in Canda. URL: http://www.cosewic.gc.ca [Revision date: 21 January 2002].

Cotterill, S.E. 1997. Status of the swift fox (*Vulpes velox*) in Alberta. Alberta Environmental Protection, Wildlife Management Division, Wildlife Status Report No. 7. Edmonton, AB. 17 pp.

Coues, E. 1877. The fur-bearing animals of North America [microform]: a monograph of American Mustelidae. In History of North American mammals. Estes and Lauriat, Boston, Massachusetts, United States. 348 pp.

Dagg, A.I. 1974. Mammals of Ontario. Otter Press, Waterloo, ON. 159 pp.

Didiuk, A.B. 1999. Reptile and Amphibian Component Report in Canadian Forces Base Suffield National Wildlife Area Wildlife Inventory. Canadian Wildlife Service, Environment Canada, Edmonton, AB. 69 pp.

Drake, G.E. and C.C. Presnall. 1950. A badger preying upon carp. Journal of Mammalogy. 31:355-356.

Fowler, R.L. 1937. Changes in the natural history of the High River District, Alberta. The Canadian Field Naturalist. 51:15-16.

Goodrich, J.M. and S.W. Buskirk. 1998. Spacing and ecology of North American badgers (*Taxidea taxus*) in a prairie-dog (*Cynomys leucurus*) complex. Journal of Mammalogy. 79:171-179.

Gummer, D.L. 1997. Status of the Ord's kangaroo rat (*Dipodomys ordii*) in Alberta. Alberta Environmental Protection, Wildlife Management Division, Wildlife Status Report No. 4. Edmonton, AB. 16 pp.

Hawkins, A.H. 1907. Coyote and badger. The Ottawa Naturalist. 21:37.

Henke, S.E. and F.C. Bryant. 1999. Effects of coyote removal on the faunal community in western Texas. Journal of Wildlife Management. 63:1066-1081.

IUCN (International Union for Conservation of Nature and Natural Resources). 2000. 2000 IUCN Red List of Threatened Species. http://www.redlist.org/ [Revision Date: 1 November 2000].

Johnson, D.H., A. B. Sargeant and R. J. Greenwood. 1989. Importance of individual species of predators on nesting success of ducks in the Canadian Prairie Pothole Region. Canadian Journal Zoology. 67:291-297.

Kiliaan, H.P.L., C. Mamo, and P. C. Paquet. 1991. A coyote, *Canis latrans*, and badger, *Taxidea taxus*, interaction near Cypress Hills Provincial Park, Alberta. The Canadian Field-Naturalist. 105:122-123.

Lindzey, F.G. 1976. Characteristics of the natal den of the badger. Northwest Science. 50:178-180.

Lindzey, F.G. 1978. Movement patterns of badgers in northwestern Utah. Journal of Wildlife Managment. 42:418-422.

Lindzey, F.G. 1982. Badger *Taxidea taxus*. Pp. 653-663 in Wild Mammals of North America - Biology, Management, and Economics. (J.A. Chapman and G.A. Feldhammer, eds.) Johns Hopkins University Press, Baltimore, Maryland, United States.

Linhart, S.B. and W.B. Robinson. 1972. Some relative carnivore densities in areas under sustained coyote control. Journal of Mammalogy. 53:880-884.

Long, C. 1972. Taxonomic revision of the North American badger, *Taxidea taxus*. Journal of Mammalogy. 53:725-759.

Manitoba Conservation Data Centre. 2002. Species and Plants Community Database. Manitoba Natural Resources. URL: http://web2.gov.mb.ca/conservation/cdc/ [Accessed: 15 February 2002].

Messick, J.P. 1987. North American Badger. Pp. 586-597 in Wild furbearer management and conservation in North America. (M. Novak, J.A. Baker, M. E. Obbard and Bruce Malloch, eds.) Ontario Ministry of Natural Resources, Toronto, Ontario, Canada.

Messick, J.P. and M.G. Hornocker. 1981. Ecology of the badger in southwestern Idaho. Wildlife Monograph. 76:1-53.

Michener, G.R. 2000. Caching of Richardson's ground squirrels by North American Badgers. Journal of Mammalogy. 81:1106-1117.

Minta, S.C. 1993. Sexual differences in spatio-temporal interaction among badgers. Oecologia. 96:402-409.

Minta, S.C., K. A. Minta, and D. F. Lott. 1992. Hunting associations between badgers (*Taxidea taxus*) and coyotes (*Canis latrans*). Journal of Mammalogy. 73:814-820.

National Research Council. 1995. Science and the Endangered Species Act.

National Academy Press, Washington, DC. 271 pp.

NatureServe Explorer: An online encyclopedia of life [web application]. 2001. Version 1.6 . Arlington, Virginia, USA: NatureServe. Available: http://www.natureserve.org/explorer [Accessed: 23 September 01].

Newhouse, N.J., and T. A. Kinley. 2000. Ecology of American badgers near their range limit in southeastern British Columbia. Prepared for: Columbia Basin Fish and Wildlife Comp. Program, Nelson, BC; Crestbrook Forest Industries, Cranbrook, BC; East Kootenay Environmental Society, Kimberley, BC and Parks Canada, Radium Hot Springs, BC. 21 pp.

Newhouse, N., and T. Kinley. In prep. Update COSEWIC status report on American badger (*Taxidea taxus*). Committee on the Status of Endangered Wildlife in Canada (COSEWIC), Ottawa, ON. 34 pp.

Novak, M., M.E. Obbard, J. G. Jones, R. Newman, A. Booth, A. J. Satterthwaite, and G. Linscombe. 1987. Furbearer harvests in North America 1600-1984 in Wild furbearer management and conservation in North America. Ontario Trappers Association, Toronto, ON. 270 pp.

Ontario Natural Heritage Information Centre. 2002. Lists of Ontario Species. Ministry of Natural Resources. URL: http://www.mnr.gov.on.ca/MNR/nhic/nhic.html [Updated: 4 February 2002].

Pattie, D., and C.C. Fisher. 1999. Mammals of Alberta. Lone Pine Publishing, Edmonton, AB. 240 pp.

Pattie, D., and R. S. Hoffman. 1990. Mammals of the North American parks and prairies. D. L. Pattie, Edmonton, AB. 600 pp.

Rathbun, A.P., M. C. Wells, and M. Bekoff. 1980. Cooperative predation by coyotes on badgers. Journal of Mammalogy. 61:375-376.

Robinson, W.B. 1953. Population trends of predators and fur animals in 1080 station areas. Journal of Mammalogy. 34:220-227.

Robinson, W.B. 1961. Population changes of carnivores in some coyote-control areas. Journal of Mammalogy. 42:510-515.

Salt, J.R. 1976. Seasonal food and prey relationships of badgers in east-central Alberta. Blue Jay. 34(2):119-122.

Sargeant, A.B., R. J. Greenwood, M. A. Sovada, and T. L. Shaffer. 1993. Distribution and abundance of predators that affect duck production - Prairie Pothole Region. URL: http://www.npwrc.usgs/gov/resource/distr/others/predator/predator.htm [Revision date: 16 July 1997].

Sargeant, A.B., and D. W. Warner. 1972. Movements and denning habits of a badger. Journal of Mammalogy. 53: 207-210.

Saskatchewan Conservation Data Centre. 2002. Vertebrate Species Lists. URL: http://www.biodiversity.sk.ca/FTP.htm [Accessed: 15 February 2002].

Seaburg, W.R. and P.T. Amoss. 2000. Badger and coyote were neighbors. Pp. ?-? in Northwest Readers Series (R.J. Frank, ed.) Oregon State University Press, Corvallis, OR. 36 pp.

Seton, E.T. 1909. Life histories of northern animals - an account of the mammals of Manitoba. Charles Scribner's Sons,

New York, New York, United States. 1267 pp.

Schowalter, T. 2000. An interview survey for long-tailed weasels and other wildlife in southern Alberta. Alberta Conservation Association, Edmonton, AB. 19 pp.

Smith, H.C. 1992. Mammals of the Drumheller area. Provincial Museum of Alberta, Natural History Occasional Paper No. 17, Edmonton, AB. 25 pp.

Snead, E. and G.O. Hendrickson. 1942. Food habits of the badger in Iowa. Journal of Mammalogy. 23:380-391.

Soper, J.D. 1946. Mammals of the northern great plains along the international boundary in Canada. Journal of Mammalogy 27:127-153.

Soper, J.D. 1964. The Mammals of Alberta. Hamly Press Ltd., Edmonton, AB. 402 pp.

Soper, J. D. 1973. The mammals of Waterton Lakes National Park, Alberta. Report Series Number 23. Canadian Wildlife Service, Ottawa, ON. 57 pp.

Sovada, M. A., J. M. Roaldson, and A. B. Sargeant. 1999. Foods of American badgers in west-central Minnesota and southeastern North Dakota during the duck nesting season. URL: http://www.npwrc.usgs.gov/resource/2000/ambad/ambad.htm [Accessed: 27 January 2001].

Stardom, R.P. 1979. Status report on the American badger *Taxidea taxus* in Canada. Committee on the Status of Endangered Wildlife in Canada (COSEWIC), Ottawa, ON. 22 pp.

Sullivan, J. 1996. *Taxidea taxus*. U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station, Fire Sciences Laboratory (2002, February). Fire Effects Information System, [Online]. URL: http://www.fs.fed.us/database/feis/animals/mammal/tata/index.html [Accessed: 10 February 2002].

Todd, A.W. and L.C. Giesbrecht. 1979. A review of Alberta fur production and management, 1920-21 to 1977-78. Alberta Energy and Natural Resources Fish and Wildlife Division, Edmonton, AB. 28 pp. + appendices

Wellicome, T.I. 1997. Status of the burrowing owl (*Speotyto cunicularia hypugaea*) in Alberta. Alberta Environmental Protection, Wildlife Management Division, Wildlife Status Report No. 11, Edmonton, AB. 21 pp.

Wildlife Management Division. 1996. The Status of Alberta Wildlife. Alberta Environmental Protection, Wildlife Management Division, Edmonton, AB. 44 pp.

World Wildlife Fund Canada. 1988. Prairie conservation action plan 1989 - 1994. World Wildlife fund Canada, Toronto, ON. 38 pp.

APPENDIX 1. Definitions of selected legal and protective designations.

A. The General Status of Alberta Wild Species 2000 (after Alberta Sustainable Resource Development 2001)

2000 Rank	1996 Rank	Definitions
At Risk	Red	Any species known to be at risk after formal assessment and designation as Endangered or Threatened in Alberta.
May Be At Risk	Blue	Any species believed to be at risk. These species will require a detailed assessment for possible formal designation as Endangered or Vulnerable.
Sensitive	Yellow	Any species known to be, or believed to be, particularly sensitive to human activities or natural events.
Secure	Green	Any species known to be, or believed to be, not at risk.
Undetermined	Status Undetermined	Any species where not enough information exists to adequately use the ranking system (exceptional cases only).
Not Assessed	n/a	Any species known or believed to be present but which have not yet been evaluated.
Exotic/Alien	n/a	Any species that have been introduced as a result of human activity.
Extirpated/Extinct	n/a	Any species no longer thought to be present in the jurisdiction or are believed to be extinct.
Accidental/Vagrant	n/a	Any species occurring infrequently and unpredictably outside their usual range.

B. Alberta's *Wildlife Act*

Species designated as "Endangered" under Alberta's *Wildlife Act* include those defined as "Endangered" or "Threatened" by *A Policy for the Management of Threatened Wildlife in Alberta* (Alberta Fish and Wildlife 1985):

Endangered	A species whose present existence in Alberta is in danger of extinction within the next decade.
Threatened	A species that is likely to become endangered if the factors causing its vulnerability are not reversed.

C. Committee on the Status of Endangered Wildlife in Canada (after COSEWIC 2002)

Extinct	A species that no longer exists.
Extirpated	A species that no longer exists in the wild in Canada, but occurs elsewhere.
Endangered	A species facing imminent extirpation or extinction.
Threatened	A species that is likely to become endangered if limiting factors are not reversed.
Special Concern	A species of special concern because of characteristics that make it particularly sensitive to human activities or natural events.
Not at Risk	A species that has been evaluated and found to be not at risk.
Data Deficient	A species for which there is insufficient scientific information to support status designation.

D. Heritage Status Ranks: Global (G), National (N), Sub-National (S) (after NatureServe 2001)

G1/N1/S1	**Critically Imperiled**: Critically imperiled globally because of extreme rarity or because of some factor(s) making it especially vulnerable to extinction. Typically 5 or fewer occurrences or very few remaining individuals (<1,000) or acres (<2,000) or linear miles (<10).
G2/N2/S2	**Imperiled**: Imperiled globally because of rarity or because of some factor(s) making it very vulnerable to extinction or elimination. Typically 6 to 20 occurrences or few remaining individuals (1,000 to 3,000) or acres (2,000 to 10,000) or linear miles (10 to 50).
G3/N3/S3	**Vulnerable**: Vulnerable globally either because very rare and local throughout its range, found only in a restricted range (even if abundant at some locations), or because of other factors making it vulnerable to extinction or elimination. Typically 21 to 100 occurrences or between 3,000 and 10,000 individuals.
G4/N4/S4	**Apparently Secure**: Uncommon but not rare (although it may be rare in parts of its range, particularly on the periphery), and usually widespread. Apparently not vulnerable in most of its range, but possibly cause for long-term concern. Typically more than 100 occurrences and more than 10,000 individuals.
G5/N5/S5	**Secure**: Common, widespread, and abundant (although it may be rare in parts of its range, particularly on the periphery). Not vulnerable in most of its range. Typically with considerably more than 100 occurrences and more than 10,000 individuals.
GX/NX/SX	**Presumed Extinct** (species) - Believed to be extinct throughout its range. Not located despite intensive searches of historical sites and other appropriate habitat, and virtually no likelihood that it will be rediscovered. **Eliminated** (ecological communities) - Eliminated throughout its range, with no restoration potential due to extinction of dominant or characteristic species.
GH/NH/SH	**Possibly Extinct** (species) - Known from only historical occurrences, but may nevertheless still be extant; further searching needed. **Presumed Eliminated** (Historic, ecological communities) - Presumed eliminated throughout its range, with no or virtually no likelihood that it will be rediscovered, but with the potential for restoration, for example, American Chestnut (Forest).

E. United States Endangered Species Act (after National Research Council 1995)

Endangered	Any species which is in danger of extinction throughout all or a significant portion of its range.
Threatened	Any species which is likely to become an endangered species within the foreseeable future throughout all or a significant portion of its range.

APPENDIX 2. Alberta badger observations.

BSOD ID	LAT.	LONG	NAME	OBSERVER	DATE	AGE CAT.	SEX	COUNT
BIODIVERSITY SPECIES OBSERVATION DATABASE								
57273	50.5347	-111.6870	BADGER	RUSSELL, R.	10-Jul-73	A	U	1
57274	50.5197	-111.7786	BADGER	RUSSELL, R.	24-Nov-88	A	U	1
9925	51.0414	-111.4876	BADGER	TREMBLAY, C.	5-Jul-93	A	U	1
9926	51.0559	-111.4643	BADGER	TREMBLAY, C.	7-Jul-93	A	U	1
9866	50.5611	-111.4995	BADGER	TREICHEL, B.	20-Jul-93	U	U	1
59136	50.4956	-111.4079	BADGER	ERICKSON, G.	21-Jun-95	U	U	1
59138	50.2971	-111.4968	BADGER	SCOBIE, D.	17-Jul-95	U	U	1
59139	50.3007	-111.4968	BADGER	SCOBIE, D.	19-Jul-95	U	U	1
59140	50.2862	-111.5025	BADGER	SCOBIE, D.	19-Jul-95	U	U	1
59141	50.2425	-111.5254	BADGER	SCOBIE, D.	24-Jul-95	U	U	1
59137	50.2497	-111.4052	BADGER	SCOBIE, D.	27-Jul-95	U	U	1
57277	50.5786	-111.9039	BADGER	RUSSELL, R.	15-Aug-97	U	U	2
57276	50.2833	-111.5011	BADGER	RUSSELL, R.	18-Jun-98	I	U	2
18915	50.2825	-111.5025	BADGER	RUSSELL, R.	24-Jun-98	I	U	2
18966	50.8959	-112.0417	BADGER	RUSSELL, R.	29-Sep-98	U	U	2
48600	51.6635	-112.0603	BADGER	ENGLEY, L.	25-May-99	A	U	1
59135	50.1735	-110.9004	BADGER	NICHOLSON, J.	19-Apr-00	U	U	1
57278	50.5783	-111.9017	BADGER	RUSSELL, R.	15-May-00	A	U	1
59134	50.3482	-111.3078	BADGER	NICHOLSON, J.	15-May-00	U	U	1
59132	50.8650	-112.1889	BADGER	DECKER, M.	20-May-00	U	U	1
59131	51.0105	-111.7580	BADGER	NICHOLSON, J.	26-May-00	U	U	1
59133	50.8650	-112.1717	BADGER	SISSONS, R.	6-Jun-00	U	U	4
59142	50.2262	-111.4195	BADGER	SISSONS, R.	21-Jun-00	U	U	1
59143	50.2479	-111.3851	BADGER	SCOBIE, D.	21-Jun-00	U	U	5
PROVINCIAL MUSEUM OF ALBERTA (PMA)								
	53.7167	-113.9500	BADGER	PMA	25-Jul-96	I	F	1
	50.6167	-111.9500	BADGER	PMA	23-Jul-95	A	M	1
	50.7000	-110.9500	BADGER	PMA	17-Aug-95	A	F	1
	53.9500	-113.5833	BADGER	PMA	15-Sep-84	U	U	1
	50.1667	-113.6333	BADGER	PMA	3-May-85	A	M	1
	49.0333	-112.8000	BADGER	PMA	1-Jun-82	A	F	1
	51.2333	-110.2167	BADGER	PMA	7-Aug-83	I	M	1
	51.7833	-114.1000	BADGER	PMA	Aug-78	A	F	1
	53.0833	-114.1167	BADGER	PMA	28-Jun-74	I	M	1

Appendix 2. continued

BSOD ID	LAT.	LONG	NAME	OBSERVER	DATE	AGE CAT.	SEX	COUNT
cont'd PROVINCIAL MUSEUM OF ALBERTA (PMA)								
	53.4167	-113.3833	BADGER	PMA	2-Jul-74	A	F	1
	52.5167	-112.7500	BADGER	PMA	1-Sep-71	U	U	1
	49.7167	-113.3833	BADGER	PMA	24-Aug-72	I	F	1
	53.5333	-113.5333	BADGER	PMA	1974	A	F	1
	53.5833	-113.8833	BADGER	PMA	16-Jul-72	I	M	1
	53.5333	-114.0000	BADGER	PMA	2-Jul-69	A	M	1
	53.5333	-113.6500	BADGER	PMA	Apr-68	I	F	1
	51.1167	-111.6000	BADGER	PMA	20-Jun-67	A	F	1
	53.1500	-112.6167	BADGER	PMA	24-Apr-54	A	F	1
	50.5333	-111.8000	BADGER	PMA	Dec-94	A	M	1
	50.5333	-111.8000	BADGER	PMA	Jul-94	I	F	1
	50.2333	-110.7000	BADGER	PMA	12-Jun-94	A	F	1
	49.1667	-112.8500	BADGER	PMA	28-Jul-93	I	M	1
CFB SUFFIELD NATIONAL WILDLIFE AREA (NWA)								
	UTM							
	EAST	**NORTH**						
	514800	5573100	BADGER	NWA	21-Jul-94	U	U	1
	514800	5573100	BADGER	NWA	21-Jul-94	U	U	1
	516800	5570000	BADGER	NWA	7-Aug-94	U	U	1
	522200	5582200	BADGER	NWA	7-Sep-94	U	U	1
	533600	5593500	BADGER	NWA	22-Jul-94	U	U	1
	534200	5597100	BADGER	NWA	21-Jul-94	U	U	1
	538700	5586400	BADGER	NWA	29-Aug-94	U	U	1
	541400	5585400	BADGER	NWA	16-Sep-94	U	U	1
	544300	5604000	BADGER	NWA	5-Sep-94	U	U	1
	550700	5617000	BADGER	NWA	4-Sep-94	U	U	2
	550700	5617000	BADGER	NWA	5-Sep-94	I	U	3
	498584	5563430	BADGER	NWA	27-Oct-95	U	U	1
	517050	5602200	BADGER	NWA	26-Jul-95	U	U	1
	518203	5603962	BADGER	NWA	15-Nov-95	U	U	1
	521698	5602444	BADGER	NWA	13-Nov-95	U	U	1
	523409	5576266	BADGER	NWA	22-Jul-95	U	U	1
	541140	5601811	BADGER	NWA	20-May-95	U	U	1
	543500	5608000	BADGER	NWA	8-Jul-95	U	U	1

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